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PATENT & TRADEMARK OFFICE

#10 Amdt
DSmalls Logan
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PATENT
Customer Number 22,852
Attorney Docket No. 5788.0124.00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Paola CARACINO et al.

Serial No.: 09/498,062

Filed: February 4, 2000

For: HIGH TEMPERATURE SUPERCONDUCTING CABLE AND PROCESS FOR MANUFACTURING THE SAME

Group Art Unit: 2841

Examiner: Vu, Q.

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Assistant Commissioner for Patents
Washington, DC 20231

Sir:

stdo1

SECOND SUPPLEMENTAL PRELIMINARY AMENDMENT

Prior to the examination of the above-captioned application, please amend this application as follows:

IN THE SPECIFICATION:

Please amend the specification, as follows:

Add two section headings, a section subheading, and amend the paragraph immediately after the title HIGH TEMPERATURE SUPERCONDUCTING CABLE AND PROCESS FOR MANUFACTURING THE SAME, as follows:

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--CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of International Application No. PCT/EP98/04991, filed July 28, 1998, in the European Patent Office, the content of which is relied upon and incorporated herein by reference; additionally, Applicants claim the right of priority under 35 U.S.C. § 119(a) - (d) based on patent application No. 97202433.5, filed August 5, 1997, in the European Patent Office; further, Applicants claim the benefit under 35 U.S.C. § 119(e) based on prior-filed, copending provisional application No. 60/059,986, filed September 25, 1997, in the U.S. Patent and Trademark Office.

BACKGROUND OF THE INVENTION

Field of the Invention--

Page 1, line 7, add section subheading --Description of the Related Art-- prior to the start of the paragraph beginning "The term superconducting material . . . ."

Page 5, line 23, add section heading --SUMMARY OF THE INVENTION-- prior to the start of the paragraph beginning "Therefore, the invention relates, in a first aspect . . . ."

Page 7, line 34, add section heading --BRIEF DESCRIPTION OF THE DRAWINGS-- prior to the start of the paragraph beginning "Further characteristics and advantages . . . ."

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Page 8, line 11, add section heading --DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS-- prior to the start of the paragraph beginning "With reference to Figure 1 . . . ."

Add a new Page 19 after the claims, adding the following ABSTRACT OF THE DISCLOSURE. A new, separate Page 19 including the ABSTRACT OF THE DISCLOSURE is enclosed.

--ABSTRACT OF THE DISCLOSURE

A high temperature superconducting cable includes a tubular support and a plurality of superconducting tapes. The superconducting tapes include a superconducting material enclosed in a metal covering, spirally wound onto the tubular support to form at least an electroinsulated, thermally-insulated, and refrigerated superconducting layer. The superconducting tapes also include at least a metal strip coupled to the metal covering. A process for manufacturing high temperature superconducting cables is also disclosed.--

IN THE CLAIMS:

Please cancel, without prejudice or disclaimer, claims 1, 3-18, and 20-26, and add new claims 27-50, as follows:

--27. (new) A high temperature superconducting cable, comprising:

a tubular support; and

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a plurality of superconducting tapes including a superconducting material enclosed in a metal covering and spirally wound onto the tubular support to form at least an electroinsulated, thermally-insulated, and refrigerated superconducting layer;

wherein the superconducting tapes comprise at least a metal strip coupled to the metal covering.

28. (new) The cable of claim 27, wherein the superconducting tapes have a maximum bearable tensile deformation greater than 3% during manufacture and installation.

29. (new) The cable of claim 27, wherein the superconducting tapes comprise two metal strips coupled to the metal covering.

C2 cont.

30. (new) The cable of claim 27, wherein the metal covering comprises silver or a silver-based alloy with magnesium, aluminum, nickel, or mixtures thereof.

Sub C2

31. (new) The cable of claim 27, wherein the metal strip is coupled to the metal covering by welding.

32. (new) The cable of claim 27, wherein the metal strip is coupled to the metal covering by brazing.

33. (new) The cable of claim 27, wherein the metal strip is coupled to the metal covering by gluing.

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34. (new) The cable of claim 27, wherein the metal strip is made of non-magnetic stainless steel having a low electric conductivity.

35. (new) The cable of claim 27, wherein the metal strip is made of bronze.

36. (new) The cable of claim 27, wherein the metal strip is made of aluminum.

37. (new) The cable of claim 27, wherein the tubular support is made of metal.

38. (new) The cable of claim 37, wherein the tubular support is made of non-magnetic stainless steel.

39. (new) The cable of claim 37, wherein the tubular support is made of copper.

40. (new) The cable of claim 37, wherein the tubular support has a continuous structure, either smooth or corrugated.

41. (new) The cable of claim 37, wherein the tubular support has a spirally-wound metal strip structure.

42. (new) The cable of claim 37, wherein the tubular support has a tile structure.

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43. (new) The cable of claim 37, wherein a winding angle of the superconducting tapes onto the tubular support is smaller than 40°.

44. (new) A process for manufacturing a high temperature superconducting cable, comprising the steps of:

providing a tubular support;

enclosing a superconducting material in a metal covering to form superconducting tapes;

spirally winding a plurality of the superconducting tapes onto the tubular support to form at least a superconducting layer;

electroinsulating the superconducting layer;

thermally insulating the superconducting layer; and

coupling at least a metal strip to the metal covering of the superconducting tapes to enable refrigerating the superconducting layer below a predetermined working temperature when the cable is in use.

45. (new) The process of claim 44, further comprising the step of:

controlling a maximum bearable tensile deformation of the superconducting tapes during manufacture and installation to a value greater than 3%.

46. (new) The process of claim 44, further comprising the step of:

coupling two metal strips to the metal covering of the superconducting tapes.

47. (new) The process of claim 44, wherein the coupling step is performed by welding.

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48. (new) The process of claim 44, wherein the coupling step is performed by brazing.

49. (new) The process of claim 44, wherein the coupling step is performed by gluing.

C2 Cont.

50. (new) The process of claim 44, wherein the tubular support is made of metal and a winding angle of the superconducting tapes onto the tubular support is smaller than 40°.--

REMARKS

Applicants submit this Second Supplemental Preliminary Amendment together with an Appendix to Second Supplemental Preliminary Amendment, a Response to Restriction Requirement, and a Petition for Extension of Time.

In this Amendment, Applicants add section headings, section subheadings, and an Abstract of the Disclosure to conform to U.S. practice. Additionally, Applicants amend the claims to the right of priority and benefit. Further, Applicants cancel, without prejudice or disclaimer, claims 1, 3-18, and 20-26, and add new claims 27-50, which include the same subject matter as the original claims, to improve clarity. The originally filed specification, claims, abstract, and drawings fully support the amendments to the specification and the addition of new claims 27-50. No new matter was introduced.

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If there is any fee due in connection with the filing of this Preliminary Amendment, please charge the fee to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

Dated: July 31, 2001

By:_____

Lawrence F. Galvin
Reg. No. 44,694

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APPENDIX TO SECOND SUPPLEMENTAL PRELIMINARY AMENDMENT DATED JULY 31, 2001

Amendments to the Specification

Please amend the paragraph immediately after the title HIGH TEMPERATURE SUPERCONDUCTING CABLE AND PROCESS FOR MANUFACTURING THE SAME, as follows:

This application is a continuation of International Application No. PCT/EP98/04991, filed July 28, 1998, in the European Patent Office, the content of which is relied upon and incorporated herein by reference; additionally, Applicants claim the right of priority under 35 U.S.C. § 119(a) - (d) based on patent application No. 97202433.5, filed August 5, 1997, in the European Patent Office; further, Applicants [and] claim[s] the benefit under 35 U.S.C. § 119(e) based on prior-filed, copending [of U.S. Provisional Application Number] provisional application No. 60/059,986, filed September 25, 1997, in the U.S. Patent and Trademark Office.

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APPENDIX TO SECOND AMENDMENT DATED NOVEMBER 20, 2002

Amendments to the Specification

Please amend the specification, as follows:

Amend the paragraph at page 2, lines 21-23, as follows:

With regard to geometric characteristics, it has been found that an advantageous geometry is provided by thin tapes having, generally, a thickness [of] between [0,05] 0.05 mm and 1 mm.

Amend the paragraph at page 4, lines 11-22, as follows:

A second critical stage concerns cable installation. The cable is [indeed] installed at room temperature, [so as to] which causes additional tensile and bending stresses[, and mechanical]. Mechanical connections (i.e., locking of cable heads), electric connections, and hydraulic connections (i.e., for liquid nitrogen) are carried out at room temperature. After completing installation, the cable is brought to its working temperature by feeding liquid nitrogen[, and during]. During such cooling, each cable component is subject to mechanical stresses of thermal origin, differing according to the thermal expansion coefficient of the constituting material and of the characteristics of the other elements.

Amend the paragraph at page 4, line 31 - page 5, line 2, as follows:

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To reduce tensile strains, the use of supports has been suggested that are made of a material having an expansion coefficient higher than that of the superconducting material (usually equal to [10 ÷] 10 x 10^{-6}/K - 20 x 10^{-6}/K), i.e., [in] on the order of at least 75 x 10^{-6}/K. Such material would not be a metal, as no known metal has such values, but only a polymeric material[,] such as, for instance, [teflon] Teflon®, polyethylene, and derivatives thereof.

Amend the paragraph at page 6, lines 9-17, as follows:

In this way, the capability of bearing tensile stresses increases. It has been observed that tensile deformation safely bearable by superconducting materials may [be - at the best - of] be—at best—about 3‰[; this]. This figure takes into account the fact that the superconducting materials already bear a compression deformation of about [1 ÷ 1,5‰,] 1‰ - 1.5‰ because of the different thermal contraction of the superconducting material [with respect] relative to the metal covering during the tape fabrication stage.

Amend the paragraph at page 7, line 34 - page 8, line 4, as follows:

Further characteristics and advantages of a cable and a process according to the invention will appear more clearly from the following description of a preferred embodiment, wherein reference is made to the attached drawings. In [said] the drawings:

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Amend the paragraph at page 8, lines 5-7, as follows:

[Figure] Fig. 1 is a schematic view of a high-temperature, superconducting cable according to the invention, with [partly removed parts.] portions cut away for viewing clarity;

Amend the paragraph at page 8, lines 8-10, as follows:

[Figure] Fig. 2 is a cross-sectional, schematic view of a high-temperature, superconducting tape with a metal strip, band, or laminate utilised in the cable of [Figure] Fig. 1[.];

Amend the paragraph at page 10, lines 6-15, as follows:

In addition to the described elements, cable traction elements may also be present, axially or peripherally located based on the construction and use requirements of the same, to ensure limitation of mechanical stresses applied to superconducting elements 3[; such]. Such traction elements, not shown, may be constituted, according to techniques known in the art, by [periferally placed] peripherally-placed metal armours, for instance, by roped steel wires, or by one or more axial metal cords, or by armouring [fibres] fibers of dielectric material, for instance, aramid [fibres] fibers.

Amend the paragraph at page 11, line 21, as follows:

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[18,5 10^{-6}°C] 18.5 x 10^{-6} °C

Amend the paragraph at page 11, line 23, as follows:

[80 10^{-6}°C] 80 x 10^{-6} °C

Amend the paragraph at page 12, line 1, as follows:

[15 10^{-6}°C] 15 x 10^{-6} °C

Amend the paragraph at page 12, lines 13-27, as follows:

The tables show the feasibility [either by] of both a conventional superconducting tape, with a maximum bearable tensile deformation equal to 3‰, and [by] a superconducting tape according to the invention (provided with two strips 25 located along sides 26 of the section, having a thickness of 0.045 mm and a length of [3,8] 3.8 mm, made of stainless steel, and bonded to covering 24 of the strip by tin brazing), with a maximum bearable tensile deformation equal to 5.5‰[, therefore with] (a 2.5‰ improvement). In the latter case, the minimum increase value of tensile deformation resistance necessary to ensure feasibility has been indicated, assuming (as indicated above and practically verified) that the superconducting non-reinforced

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tape can bear a 3‰ tensile deformation. Double-underlined values indicate that the 3‰ limit has been exceeded.

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